PRESIDENT'S ADDRESS

QUERCUS (OAK): A PERSPECTIVE

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The oak is an extraordinary tree. The Southern live oak (*Quercus virginiana*) is a large, majestic, broadleaf evergreen tree with a relatively short trunk and several large branches which may spread twice as wide as the tree is tall. The tree's span is often greater than 130 feet with the tree itself being less than 50 feet tall. The tree acquires its name because it is always green (Figure 1). These perpetually mature green leaves do not drop off until later in the spring after the new leaves appear, resulting in the tree being evergreen and, therefore, "live." Other oaks lose their leaves entirely before new leaves appear. Micrographs of the leaves show the enormous capacity of the live oak

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FIG. 1. Connie and Phil Mackowiak with Susan Billings under the Angel Oak, near Charleston, South Carolina.

to absorb particulate pollution. Digital topographical micrographs of a live oak leaf show "hills and valleys," convolutions and convections, on the underside of the leaf. The underside is covered with a thick layer of trichome (papilla-like structures) referred to as "leaf hairs." It has been demonstrated that the live oak is not only more efficient than other oaks but also the most efficient of all trees in removing particle pollution.

The value of removal of pollution, particularly particulate matter, but also O_3, NO_2, SO_2, CO_2, and CO, is enormous. The city of Baton Rouge is a very "leafy" city. Despite being the Louisiana state capitol with numerous governmental buildings and having the second largest Exxon refinery in the world, Baton Rouge has a larger leaf canopy than any other major city in the United States. This canopy covers 44.6% of the sky. Prior to 2007 and Hurricane Gustav, Baton Rouge's leaf canopy was 55%. Atlanta, also thought to be a very "leafy" city, has a canopy with only 36.8% coverage, while Boston's canopy is only 22.3%. The most common tree in Baton Rouge is the live oak. The value of the pollution removed by these respective canopies in these three cities is $6,200,000, $2,534,000, and $1,426,000, respectively. According to findings of the National Resource Defense Council, air pollution results in 64,000 premature heart and lung related deaths annually in the United States. In Baton Rouge alone, the tree canopy reduces annual energy costs by $8 million dollars.

Woods once constituted the greatest part of wealth of many tribes and nations. All that defined being human was of wood: the house, the town, the wagon, the plow, the post office, the pen, the window, the cask, the bottle, the goblet, and the realms of both gods and devils. The world was first of wood — 12 to 15 millennia, then of coal and oil — a mere 2500 years. Even the coal and oil are from stem and branch and trunk and root. For the temperate world the wood came from oak. In ancient Sanskrit the name for oak and for wood is the same: *duir*. Oak is easy to split and shape, first by stone axes, then by bronze, and then by iron.

The names of many people reflect the bond which existed with the wood. In the Climatological itself, directly from the forest are: Ray Dubois; from a place in the woods: Charlie Bryant (place cleared by fire); from what people did: Glenn Cobb (pollarded the trees cutting them back to eight to 15 feet — above the grazing level), Jim Hughes (dropped the entire tree), Charles Sawyers (sawed the wood), Dick Tanner (cured leather with the tannins from the bark), Dick Cooper (made barrels), Chuck Carpenter (built houses), Virginia Collier and David Coleman (waste wood into charcoal).

So why are oak trees so important and why do they seem to play such a major role in history of man? In 1985, David Bainbridge coined the word balanoculture for societies in which the oak tree in general and acorns in particular were the underpinnings of both lifestyle and diet. Evidence shows that tools used for grinding and pounding food existed long before corn or wheat or wild grasses were used as food stuffs. It has been suggested that these implements were used for grinding acorns. The Greek word for acorn is *balanos*. Bainbridge argues that societies in the Middle East, China, Mexico, and California were largely dependent on the acorn. Gathering and processing time for acorns is minimal relative to the labor and effort required to grow annual grain crops. Acorns became a staple, and those societies which utilized the acorn were the most stable. It is said that 3 weeks of harvesting acorns can yield enough acorns to last 2 to 3 years. Ancient caches of acorns have been found in large pits and adjacent to streams. Evidence of balanoculture has been found among the Turks, the Iroquois, the Cahuillas, the Tartars of Crimea, the Apache, the Corsicans, the Sardinians, the Japanese, and the Chinese. In California there were more than 100 tribes; most of which had an acorn-based diet. A large oak tree can produce 300 to 500 pounds of acorns a season. These oaks are so large that it is rumored that William Wallace, legendary Scot, concealed himself and 100 of his men in one of these large oaks.

Hominids have been around for approximately 2 million years, but they did not become people until they learned to use the oak with ax and wedge. Then we had firewood, poles, fences, boats, roadways, farms, doors, barrels, and coffins. These were followed by the tanning of leather and the making of ink. Oak was harvested like a crop with the coppice system — cut to the ground at intervals of 5, 23, 50, or 100 years. As new sprouts sprang from the coppiced trees, grazing animals often damaged the tender shoots. To protect the new growth farmers pruned the trees at shoulder height out of reach of the foraging animals. This system was called pollarding. Wood is an excellent form of heat with one cord producing approximately 22M BTUs, which is approximately equivalent to 160 gallons of heating oil.

Charcoal ended the Stone Age. With charcoal one could smelt bronze, found iron, make glass, and produce gun powder. Charcoal has three times the energy of raw wood per unit weight and for 8000 years was made by the colliers and the colemans using a long and tedious process. Without colliers and colemans and their charcoal, the 19th century would not have existed. There would have been no sword, no bell, no hinges, no glass, no pots, no gun powder, no gold, and no silver.

Discussion of oak is incomplete without mention of the famous wooden ships, the foremost, for us, being the *USS Constitution* ("Old Iron Sides"). She is a 3-masted, wooden-hulled heavy frigate. She was built as a result of the Naval Act of 1794 and named by George Washington himself. At that time, Barbary pirates were seizing American merchant ships and holding the ships and their crews for ransom. The primary material used in her construction was oak which was cut and milled near St. Simon, Georgia. Her hull was almost 2-feet thick. Approximately 60 acres of trees was needed for her construction. The hulls of the British navy's oak ships, which were barely 1-foot thick, were fondly called "the wooden walls of England." For the 2 centuries between the destruction of the Spanish Armada and the end of the Napoleonic Wars, those walls were never breached.

Live oaks are considered to be slow growing, producing wood which is hard, heavy, strong, tough, and close-grained. Their poor form as they grow, even in forests, limits this tree's use as timber. However, because of their poor form, the tree boughs were used *in toto* in such places at the keel and were, therefore, highly valued in shipbuilding. The live oak was the first species preserved by the United States government. In 1818, the then Secretary of the Navy sent men to Louisiana to survey public lands for live oaks suitable for shipbuilding. In 1828, President John Quincy Adams authorized the United States to purchase land, which comprises the present Naval Live Oaks Area, the first federal forestry plantation.

Unfortunately, oak-hulled ships are ideal culture medium for wood-decaying organisms; so much so that men were often sent below prior to inspection by an admiral to shovel out loads of toadstools and mushrooms from the ship's hold. A much-celebrated British ship of line, the *HMS Royal George*, lost its bottom as it was heaved over for "minor repairs." More than 800 people drowned including the admiral. For Britain it was a national disaster and resulted in a financial crisis. The phrase survives today: "The bottom fell out of the market."

The Age of Oak ended on March 8, 1862, at Hampton Roads when the Confederate ironclad, *CSS Virginia* (previously the *USS Merrimack*), sank two Union ships, first, the *USS Cumberland*, and then the *USS Congress*. The next day the Union ironclad, *USS Monitor*, sailed on the scene with greater than 60% of its space below the waterline and a turret mounted mid-ship with only two guns. The ship had 47 patentable inventions and was designed by John Ericson at the request of Secretary of the Navy Gideon Wells. These two ironclads fought an indecisive battle, but both were the harbingers of the end of an age.

That day the wooden navies of the world became obsolete. The word *monitor* is derived from the Latin and means admonition or warning.

In 1934, the President of Southwestern Louisiana Institute (now University of Louisiana at Lafayette), Dr. Edwin Lewis Stephens, founded the Live Oak Society. According to its bylaws, all members are live oak trees with a girth of greater than 8 feet at 4.5 feet above ground. (The only non-oak member of the society is the volunteer honorary chair who is responsible for registering the oak members.) As of May 2014, there were more than 7600 members from 14 states. In 1968, the Seven Sisters Oak in Mandeville, Louisiana, was elected president (largest girth — at greater than 38 feet). The tree survived a near direct hit by Hurricane Katrina in 2005. The tree is calculated to be more than 1500 years old. The first president, the Locke Breaux Oak, served from 1934 to 1968 when it died following sale of the land, on which it stood, from a dairy farm to a chemical company.

The Angel Oak (Figure 1) is located on Johns Island, 12 miles below the Ashley River. Some of you visited it last year when the Climatological met in Charleston. It is estimated to be more than 1400 years old and stands 66.5 feet high with a girth of 28 feet and shades an area of 17,200 square feet. This oak was severely damaged by Hurricane Hugo in 1989 but has since recovered as well. Here amongst its glory is my wife Susan with last year's president, Phil Mackowiak, and his wife, Connie. All appear rather diminutive. Although named for a previous owner named Angel, local folklore has it that the ghosts of former slaves, appearing as angels, dance around the tree. I planted a sapling from an acorn of the Angel Oak. It was three-fourths inch in diameter when planted 15 years ago (Figure 2).

Pictured here is Madame Grands Doigts (Lady Long Fingers) with this year's president in her clutches (Figure 3). The Madame's origin in South Louisiana is mysterious and her identity changes from one who brings small gifts after Christmas (New Year's or the Twelfth Night) to one who does not come at holiday time at all, but one who is used to frighten little children into good behavior.

I hope that all of you developed over these few minutes an infatuation, if not a true love affair, with these wonderful trees. Oaks are variable and at times difficult to identify, especially in younger specimens. More than 800 species have been described. Over the years I have personally planted more than 150 live oaks plus 25 other species of oaks.

"A society grows great when old men plant trees in whose shade they know they will never sit."

Greek Proverb

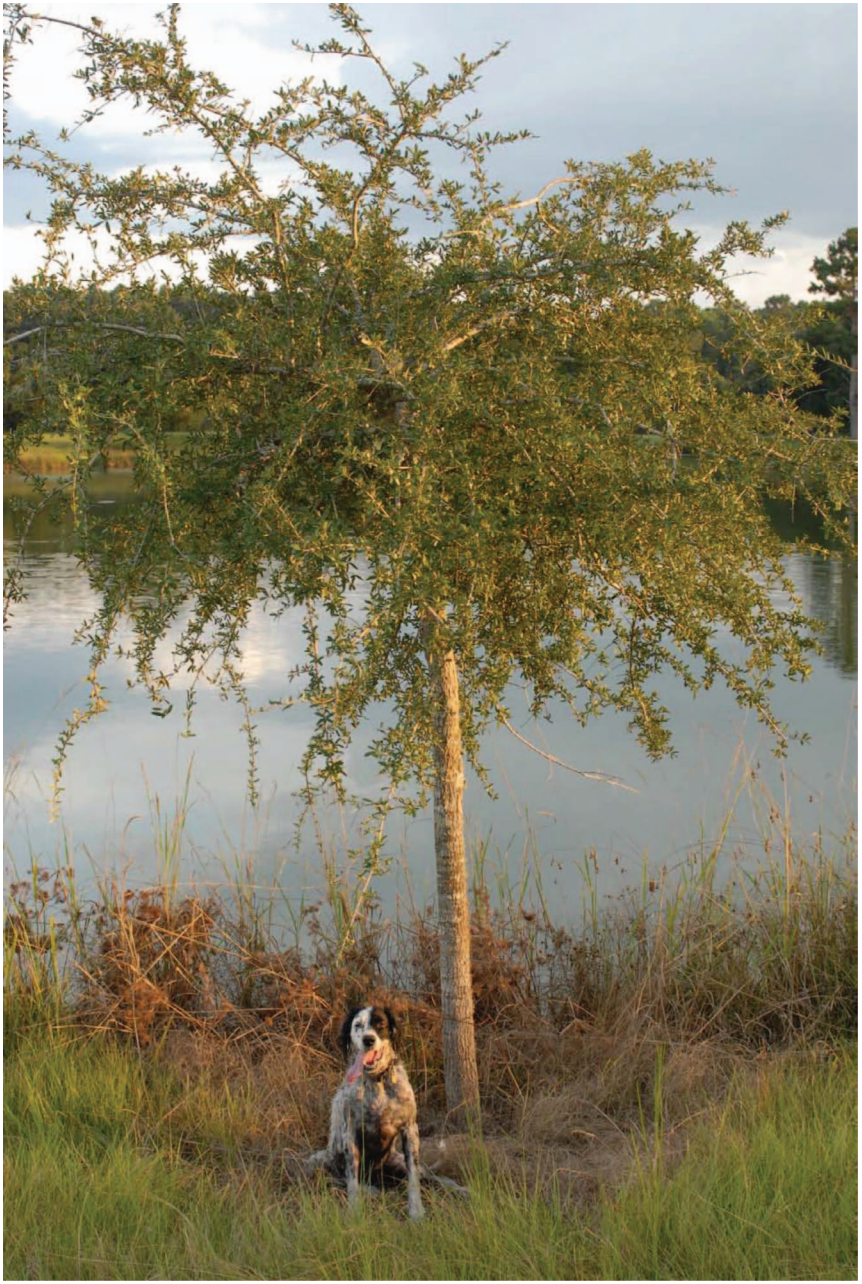

FIG. 2. Tree started from an acorn from the Angel Oak, Twin Oaks, Mississippi.

FIG. 3. Frederic Billings among the "fingers" of Madame Grands Doigts, near Arnaudville, Louisiana, on Bayou Teche.

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